

WHAT IS CLAIMED IS:

1. A product shape designing process for designing an optimal product shape, comprising;

a shape generation step of setting plural basal shapes and linearly combining the basal shapes to generate plural sample product shapes,

a performance evaluation step of obtaining evaluation values on a product performance of the sample product shapes generated in the shape generation step, and

a product shape extraction step of extracting an optimal product shape whose evaluation value on the product performance is an optimal value based on the evaluation values on the product performance obtained in the performance evaluation step.

2. The product shape designing process according to claim 1, wherein said shape generating step generates the sample product shapes by combining the basal shapes using respective weighting coefficients of the plural basal shapes.

3. The product shape designing process according to claim 2, wherein said shape generating step sets up the weighting coefficients based on Design of Experiments.

4. The product shape designing process according to claim 1,

wherein said performance evaluation step gives the evaluation value on the product performance by a structural analysis, and wherein said product shape extracting step gives a curved surface approximation function based on the evaluation values on the product performance of the sample product shapes and extracts the optimal product shape based on the curved surface approximation function.

5. The product shape designing process according to claim 4, wherein:

said shape generating step generates the sample product shapes by combining the basal shapes using respective weighting coefficients of the plural basal shapes, and

said product shape extracting step gives the curved surface approximation function which uses the weighting coefficients as design variables, and gives the weighting coefficients that lead to the optimal value on the product performance according to the curved surface approximation function to extract the optimal product shape.

6. The product shape designing process according to claim 5, wherein said shape generating step sets up the weighting coefficients based on Design of Experiments.

7. The product shape designing process according to claim 1,

wherein the product shape is an in mold tire profile defined by a tire vulcanizing mold or a tire profile upon tire deflation.

8. The product shape designing process according to claim 7, wherein the plural basal shapes are plural deformed shapes in eigen modes in a cross-sectional direction of a tire.

9. The product shape designing process according to claim 8, wherein the eigen modes include at least an eigen mode from a first-order to a fifth-order eigen mode in the cross-sectional direction of the tire.

10. A pneumatic tire having a tire profile designed by linearly combining normalized deformed shapes in first, second and third-order eigen modes in a cross-sectional direction as tire basal profiles using weighing coefficients,

wherein the weighting coefficient for the deformed shape in the first-order eigen mode is +0.6 or more and +0.9 or less,

wherein the weighting coefficient for the deformed shape in the second-order eigen mode is -1.5 or more and -1.2 or less, and

wherein the weighting coefficient for the deformed shape in the third-order eigen mode is +1.2 or more and +1.5 or less.